Limits on the Gravity Wave Background From Microlensed Quasars

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Abstract

The paper previously submitted under this title is incorrect in that it drastically overestimates the cumulative deflection due to a gravitational wave (GW) background. Avi Loeb gives a simple argument that there can be no $(D\omega)^{1/2}$ enhancement: since the problem is linear in h, one can decompose the GWs into plane waves and for each of these there is no enhancement.

Subject Headings: gravitational lensing – gravitational radiation – quasars

Preprint: OSU-TA-14/95

1. Introduction

Gravitational waves propagate almost freely through media which are opaque to photons and even to neutrinos. This makes gravitational radiation a unique probe of matter in the most extreme conditions such as those that prevail during the collision or collapse of compact objects or in the early universe. However, the same property that allows gravitational waves to emerge freely from these hostile environments also makes them difficult to detect. While the existence of gravitational waves has been clearly demonstrated from pulsar timing (Taylor et al. 1992), the prospect of using them as a direct astrophysical probe appears to be at least several years (and substantial technological improvements) away. The problem is that the very small scale of the effect demands an extremely stable system preferably extended over a long baseline, and with a very sensitive detector. Interferometers have been seen as the instrument of choice.